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ABSTRACT

Mastery learning represents a prolific area of research in educational psychology that encompasses two principal characteristics: (1) an optimistic set of assumptions regarding the capability of students to learn if alterable variables comprising the conditions of learning are optimized; and (2) an array of adaptive instructional procedures predicated on the medical model of diagnostic-prescriptive intervention. From both theoretical and practical perspectives, mastery learning has served as a catalyst for a paradigm shift from a dominant prediction-selection model to an emerging diagnostic-developmental model. Since B. S. Bloom's seminal publication in 1968, the preponderance of mastery learning literature has focused on the North American experience. In response to the lack of a worldwide perspective on mastery learning, this paper attempts to operationalize the international dimensions of mastery learning by specifying its essential meaning and defining characteristics, its current status in the international professional literature, and needed initiatives for advancing mastery learning efforts internationally. These efforts concentrate on: (1) establishing communication networks; (2) determining topical areas of focus; and (3) formulating research and development methodologies. (Contains 117 references.) (SLD)

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An International Perspective on Mastery Learning

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Abstract

Mastery learning represents an increasingly prolific area of research in educational psychology that encompasses two principal characteristics: (a) an optimistic set of assumptions regarding the capability of students to learn if alterable variables comprising the conditions of learning are optimized and (b) an array of adaptive instructional procedures predicated on the medical model of diagnostic-prescriptive intervention (Bloom, 1968, 1976). From both theoretical and practical perspectives on learning and instruction, then, mastery learning has served as a catalyst for a paradigm shift from a dominant prediction-selection model to an emerging diagnostic-development model (Dyck, Van de Looverbosch, & Wouters, 1982).

Since Bloom's seminal publication in 1968, the preponderance of the mastery learning literature has focused on the North American experience and its socio-psycho-cultural interpretations with only occasional documentation of mastery learning efforts in Western Europe, Asia, the Middle East, South America, and Australia (Anderson & Block, 1985; Hymel, 1990, 1991; Thomas, 1985). In response to this paucity of a worldwide perspective on mastery learning, this paper attempts to operationalize what could be labelled the international dimensions of mastery learning by specifying its (a) essential meaning and defining characteristics, (b) current status in the professional literature, and (c) needed initiatives for advancing mastery learning efforts internationally.

An International Perspective on Mastery Learning

Benjamin S. Bloom's (1968) article titled "Learning for Mastery" represented an extrapolation of, as well as a resurgence of interest in, the relationship between the concepts of time as a variable and high student achievement as a constant. At least in the context of the 20th century, this conceptual and research focus can be traced initially back to the efforts of Washburne (1922) and Morrison (1926) and, more recently, to the seminal work of Carroll (1963).

Essentially, mastery learning may be characterized as an increasingly expanding research area in educational psychology that entails two major features (Bloom, 1968, 1976, 1978, 1980): First, it encompasses an optimistic set of theoretical assumptions regarding the capability of students to learn what we have to teach them provided that certain alterable variables constituting the essential conditions of learning are optimized. Secondly, it incorporates an array of adaptive instructional procedures reflective of the medical model of diagnostic-prescriptive intervention. Success or failure in school learning, then, is largely an artifact of the extent to which we adequately accommodate specific learner-based and instruction-oriented variables considered to be alterable rather than static.

Regarding the optimistic theoretical assumptions of mastery learning, Bloom (1968, 1971, 1976, 1978, 1980) and his colleagues (most notably: Anderson & Block, 1975; Block, 1971, 1980, 1985) have argued that under favorable learning conditions the following expectations are indeed viable: (a) Most students--perhaps over 90%--can master what we have to teach them, thereby resulting in a desired negatively skewed distribution of achievement scores rather than the unfortunate though frequently cherished normal bell-shaped distribution of scores. (b) As many as 80% of our students can attain those high levels of achievement typically reached by only the top 20% of students. (c) Most students become very similar--rather than dissimilar--with respect to learning ability, rate of learning, and motivation for further learning as they progress more deeply into a given course and/or program of studies. (d) Profound advancements in student performance occur not only in the domain of cognitive learning but also in the affective realms of student attitudes, interests, self-concept, and mental health.

Concerning the adaptive instructional practices of mastery learning that reflect a type of diagnostic-prescriptive intervention, Anderson (1981) has focused on the following functions served by mastery learning components regardless of how they are named: (a) communicating positive expectations to students, teachers, administrators, and parents; (b) teaching new

content/objectives within a larger subject-matter context and at appropriate levels of difficulty by way of relating the new learning to prior learning; (c) monitoring student learning via diagnostic-progress tests and making instructional decisions based on this ongoing evidence; (d) prescribing corrective work when needed to help students overcome errors and misunderstandings before they accumulate and interfere with subsequent learning tasks; and (e) basing student grades on their performance relative to pre-specified learnings that are sought rather than relative to the performance of other students.

In both the theoretical and practical realms, then, mastery learning has served as a major catalyst for encouraging nothing less than a paradigm shift where the nature of learning and instruction is concerned. As suggested by Dyck (1976), Dyck and Wellens (1979), and Dyck and Wouters (1989), the dominant prediction-selection paradigm has emphasized such themes as a static conception of individual differences, revealing and analyzing individual differences, heterogeneity as outcome and purpose of instruction, norm-referenced testing, selection of talent, and a nominal period of instruction and learning. By way of contrast, these same authors characterize the emerging diagnostic-development or outcome-based paradigm associated with mastery learning as highlighting such notions as pursuing equal outcomes, searching for alterable learner- and instruction-oriented variables, expecting success by virtually all students in the context of minimal variance, criterion-referenced testing, development of talent, and a focus on time-on-task. Or, in the words of Dyck, Van de Looverbosch, and Wouters (1982),

> . . . a basic characteristic of almost any system of high education is the reproduction of heterogeneous results. Two points of view can be discerned with regard to this process of reproduction.
>
> The first approach is the prediction-selection paradigm. This has been the dominant philosophy of education since the beginning of this century, and it continues to be so today, because it provides a rationale for existing institutions and their functions. Heterogeneity of capabilities of learning outcomes is regarded as a 'natural' phenomenon, largely unshakable by whatever measures one might take. Selection being the unavoidable output of an educational system, the goal of instruction is cast in terms of improving the accuracy and the 'fairness' of this process. Improvement of effectiveness, then can only mean that we develop reliable instruments for prediction. Failure rates may decrease if we prevent students who are 'bound to fail' to participate in the process. The dominant paradigm which we have described briefly is challenged by an alternative philosophy which we

> may call an outcome-based paradigm. Within this relatively recent and rapidly developing perspective, the primary goal of instruction is to ensure that all students who decide to enroll and who are prepared to make a considerable effort, reach the finish with success. An overwhelming stream of research literature on mastery learning and personalized systems of instruction shows that this can be done. . . . This paradigm takes an entirely different stand towards learning and instruction. Heterogeneity of capabilities and of results is not a natural or 'normal' phenomenon; it is rather an error signal: if a 'normal' curve shows up, and this curve reproduces itself at subsequent points in time, something is wrong. This approach requires of course another look at the way in which outcomes are determined. They are no longer seen as emanating from mostly stable and personal attributes of the student. Instead, all attention is focused on the alterable variables of the instructional process . . . . (pp. 4-6)

Predominant Features of the Mastery Learning Literature

The available literature on mastery learning thus far may be partially viewed in terms of the two major organizational forms or orientations it assumes as well as the four types of inquiry that are research-question based. Additionally, the literature reflects communication networks established for mastery learning resources along with a pattern of geographical locations where mastery learning efforts have been concentrated.

Organizational Forms/Orientations of Mastery Learning

As indicated earlier, mastery learning is based on John B. Carroll's (1963) model of school learning that relates the time factor in school learning to the degree of learning that actually occurs. Accordingly, mastery learning has assumed two basic organizational forms: (a) Bloom's (1968) Learning for Mastery (LFM) approach that is group-based and teacher-paced, has evolved primarily from the field of education, and has had its major impact at the elementary and secondary levels of schooling; and (b) Keller's (1968) Personalized system of Instruction (PSI) strategy that is more individually-based and student-paced, has evolved principally from the discipline of psychology, and has had its principal influence at the college/university level of education. Block and Burns (1976) provide perhaps the most succinct yet comprehensive characterization of these two organizational forms of mastery learning.

Types or Genre of Mastery Learning Research

Although it was compiled 16 years ago, the benchmark literature review by Block and Burns in AERA's 1976 volume of Review of Research in Education still is quite strategic in giving a framework within which to consider mastery learning research (MLR) both prior and subsequent to that publication.

According to these authors, the so-called Type I MLR represents the earliest genre and focuses on the research question "Does it work?" The reference here is to mastery learning studies that investigate dependent variables that are quantitative in nature (viz., degree of learning and variability in learning) and/or qualitative (viz., kinds of learning).

Type II MLR represents a logical sequel to the aforementioned in that it begins to explore beyond the immediate cognitive effects of mastery learning strategies on students and to focus on the question, "If it works, then what might follow?" The expanded emphasis here is on such areas as affective consequences; time considerations; learning-to-learn effects; and teacher-role, administrative, curricular, sociological, and economic implications.

Type III MLR addresses the following two kinds of studies and related research questions: (a) student-entry characteristic studies that focus on the question, "Do mastery strategies have the same effects on different kinds of students, i.e., students with different kinds of cognitive and affective entry characteristics?" and (b) component studies that ask "Do some components of mastery strategies have greater effects on students than other components?" The essential emphasis here is on the ATI genre of research in that the concern is with possible interactions between learner-oriented and instruction-oriented variables considered alterable in nature.

Finally, the Type IV MLR attempts to translate findings about why mastery strategies work into statements of how they can be implemented and, hence, tries to answer the question, "How does it work?" Attention here, then, is on the development and dissemination of teacher-training materials at both the pre-service and in-service levels.

Communication Networks and Geographical Emphases

The coordination of material and personnel resources in mastery learning via so-called communication networks refers to established professional societies, organizations, forums, and data bases accessible to mastery learning researchers and practitioners alike.

In both areas of communication networks and geographical emphases, it is apparent that the preponderance of efforts to address the theoretical and practical aspects of mastery learning is focused on the North American experience and its particular socio-psycho-cultural interpretations. Comparatively, an international profile of communication networks beyond North America reveals considerably fewer instances of professional societies, forums, and data bases for those interested in mastery learning. The same characterization can be made of the geographical locations of researchers, practitioners, and their institutional affiliations where the initiation of mastery learning programs and the generation of mastery learning documents are concerned.

The spectrum of professional societies, organizations, forums, and data repositories based in North America includes, e.g., the following: the American Educational Research Association's (AERA) Special Interest Group (SIG) on Mastery Learning; the Network for Outcome-Based Schools and its quarterly journal Outcomes; the University of San Francisco's Center for Outcome-Based Education; the International Center on Outcome-Based Restructuring (Eagle, Colorado); the National Center of Outcome Based Education (Phoenix, Arizona); Loyola University of New Orleans' Clearinghouse on Mastery Learning; conference sessions sponsored by the aforementioned organizations; the Educational Resources Information Center (ERIC) data bases; and the American Psychological Association's (APA) Psychological Abstracts data base--to name only the major sources. Although these communication networks obviously contain many significant contributions from professional colleagues worldwide, the fact still remains that these international contributors beyond North America are proportionately small in representation. Furthermore, the plight of those interested in mastery learning is also frustrated by what seems to be a paucity (at best) in the international community of analogs to those North American-based communication networks cited earlier.

The needs, then, are readily apparent where the internationalization of mastery learning theory and practice is concerned. Accordingly, the second major section of this paper provides a delineation of what might be called the international dimensions of mastery learning in terms of its (a) meaning and characteristics, (b) current status, and (c) recommendations for advancing mastery learning efforts worldwide.

International Dimensions of Mastery Learning

Meaning and Characteristics

Precisely because mastery learning has yet to be explored comprehensively from an international perspective, it is critical that its meaning and characteristics in a worldwide context be considered in terms of cross-cultural relevance, information sources, and nature and scope of mastery learning efforts.

Cross-cultural relevance. It perhaps borders on stating the obvious to suggest that the relevance of mastery learning's theoretical assumptions and instructional practices may indeed vary considerably when examined from the vantage point of diverse cultures. Nonetheless, a belief system and corresponding instructional strategy that challenge--unsuccessfully at times even on its own turf--the prevailing prediction-selection paradigm of learning and instruction by offering an alternate diagnostic-development model, must surely be scrutinized in terms of possible consistencies and inconsistencies with the cultural milieu of any society in which it might be proposed. For example, as noted by Cummings in 1977,

> Mastery Learning as such has not been introduced in Japan. On the other hand, traditional Japanese educational philosophy shares many precepts with mastery learning. Japanese educators have never paid much attention to the innate abilities of learners. They have tended to assume that anybody can learn a task given a determined effort. Mind over matter is an assumption of Japanese learning in settings as diverse as the modern classrooms and the traditional dojo where kendo, judo, and other martial arts are taught.
>
> It is no accident that Japan's Nineteenth Century educators, after reviewing various foreign theories of pedagogy expressed their greatest interest in the ideas of Pestalozzi and Herbart, two thinkers whom Bloom credits with laying the intellectual foundations of Mastery Learning theory. In the postwar period, Japan's educators have expressed strong interest in Dewey and in the Russian pedagogist, Markarenko--both of whom emphasized educational goals similar to Mastery Learning. (pp. VI-8-9)

This necessity for considering cross-cultural issues where the viability of both the theory and practice of mastery learning are concerned naturally lends itself to the literature available on international education (e.g.: Debeauvais, 1985b; Heater, 1985; Holmes, 1985; Husen, 1985; King, 1985; Ottobre, 1985; Perkins, 1985; Postlethwaite, 1985; Stone, 1985; Sutton, 1985).

Equally pertinent--and in some instances perhaps even more critical than the international educational literature--are those sources on comparative education (e.g.: Anderson, 1985; Brickman, 1985; Coombs, 1985; Debeauvais, 1985a; Eckstein, 1985; Foster, 1985; Holmes, 1985a, 1985b; Ignas & Corsini, 1981; Irvine & Berry, 1988; Kallen, 1985; Noah, 1985; Porras-Zuniga, 1985; Rosier, 1985; Shade, 1989). Also, in view of mastery learning's most basic affiliation with the discipline of psychology, the expanding literature on international psychology indeed has a strategic role to play (see, e.g..: Ardila, 1982; Hall, 1990; McPherson, 1986; Moghaddam, 1987; Russell, 1984; Sexton & Misiak, 1984; and Smith, 1983). And perhaps even more to the point, cross-cultural psychology sources are critical to considerations of the diversity of human behavior and the cultural context in which it occurs (e.g.: Berry, Poortinga, Segall, & Dasen, 1992; Brislin, 1990; Laboratory of Comparative Human Cognition, 1986; Rogoff & Morelli, 1989; Tharp, 1989).

Information sources. A second factor contributing to the meaning and characteristics of mastery learning in an international context is that of the availability of information sources worldwide. The concern here is with the existence and accessibility of such communication networks as the following: (a) professional societies for organizing mastery learning personnel, (b) forums for disseminating mastery learning efforts, and (c) data bases or repositories for consolidating and monitoring the mastery learning literature. Of course, the availability of such information sources worldwide would serve to authenticate the internationalization of mastery learning.

Nature and scope of mastery learning efforts. A third factor defining the meaning and characteristics of mastery learning as a viable international movement in educational psychology is that of the nature and scope of mastery learning efforts worldwide. An ongoing profile of mastery learning initiatives in terms of essential focus and extensiveness of treatment will provide a sense of what has been attempted, where it has occurred, how well it has succeeded, and what still remains to be addressed. The "where it has occurred" theme would be particularly important in that the geographic location of the author, institutional affiliation, and/or site of the mastery learning effort would provide a sense of mastery learning's geographic "migration" beyond North America.

Current Status of Mastery Learning

The second dimension of mastery learning considered from an international perspective is perhaps the most obvious; viz., the current status of mastery learning initiatives worldwide. This important dimension can be operationalized as follows: (a) a

representative overview of the mastery learning literature, (b) a taxonomy of mastery learning efforts classified by geographical locations and topical areas, and (c) sources and methods for identifying mastery learning initiatives.

Representative overview of the literature. The entries by Thomas (1985) as well as Anderson and Block (1985) in the International Encyclopedia of Education: Research and Studies call attention to the fact that mastery learning's principal focus has been on the North American experience with comparatively only occasional documented efforts in Western Europe, Australia, the Middle East, Asia, and South America. This trend had been suggested earlier--and later corroborated--by entries in a comprehensive bibliography on mastery learning (Hymel, 1982), state-of-the-art literature reviews of mastery learning (Block & Burns, 1976; Guskey & Gates, 1986; Guskey & Pigott, 1988; Kulik, Kulik, & Bangert-Drowns, 1990; Kulik, Kulik, & Cohen, 1979), and attempts to identify major gaps in the literature that suggest future directions for mastery learning efforts (Hymel, 1990, 1991).

A recent computer search of the ERIC data bases (i.e., Resources in Education and Current Index to Journals in Education) as well as Psychological Abstracts revealed a total of 1,988 citations corresponding to mastery learning/testing as search terms. Of this total number, only 110 entries could be associated with authors, institutional affiliations, and/or research settings geographically positioned beyond North America. Of course this is admittedly only a rough index, and undoubtedly there are mastery learning contributions occurring internationally that are not captured by these data bases; however, the point is still demonstrated that there is a paucity of non-North American mastery learning efforts that needs to be examined closely and rectified.

Taxonomy reflecting geographical locations and topical areas. Although quite general in nature, the representative overview of mastery learning just mentioned does suggest certain geographical locations and topical areas that constitute a taxonomy or classification scheme. The following mastery learning citations, then, are acknowledged as specific to certain locations but do not even approach being exhaustive: Australia (Chan & Cole, 1986; Gay, 1984; Hermann, 1986; McBeath, 1986; Stanford & Imrie, 1981; Ward, 1979); Belgium (Dyck & Wouters, 1989; Dyck, Van de Looverbosch, & Wouters, 1982); Brazil (Keller & Sherman, 1974; Sherman, 1974); Chile (Pizarro Sanchez, 1992); China (Zhongliang, Xuyang, & Xiaoping, 1984); Cuba (Martuza, 1986); Egypt (Wahby, 1979); England (Pennycuik & Murphy, 1986; Straker, 1988); Finland (Lahdes, 1983); France (Council of Europe, 1975); Germany (Langeheine, 1992; Sandrin, 1990); India (Chaudhari & Vaidye,

1986); Ireland (Whiting, 1982, 1984); Israel (Katz, 1986; Kremer-Hayon & Ben-Peretz, 1984; Lewy & Nevo, n.d.; Mevarech, 1986, 1991; Mevarech & Werner, 1985; Reves & Levine, 1990; Tenenbaum, 1986); Japan (Cummings, 1977); Korea (Kim, 1971, 1975; Lee, 1977); Lebanon (Reed, 1983); Malaysia (Nordin, 1980); Mexico (Maginnitu, 1976); Netherlands (Creemers, 1976; de Gruijtes, 1985; Reezigt & Weide, 1990; Van der Linden, 1987; Vos, 1988; Warries, 1974); New Zealand (Imrie, 1984; Studman, 1984); Nigeria (Badmus, 1976); Norway (Skaalvik, 1975); Puerto Rico (Canino & Cicchelli, 1988); Scotland (Drever, 1987; Parkinson, Mitchell, & Johnstone, 1983; Peacock, 1981); Sweden (Dahllof, 1978; Fischbein, 1979); Switzerland (Flammer, 1973); Taiwan (Chen, 1987). Evidence is also available for mastery learning's appearance in Singapore (E. Thomas, personal communication, April, 1992). The topical areas addressed via mastery learning in these countries are quite varied and span the following: agriculture, comparative education, compensatory education, curriculum planning, computer sciences, economics, foreign languages, growth and development, health science, language arts, LFM, library science, mathematics, microbiology, physics, PSI, psychometrics, science (general) teacher education, vocational education/training.

Sources and methods for identifying mastery learning efforts. The role of North American-rooted data bases such as ERIC and Psychological Abstracts has already been mentioned as foundational to locating mastery learning documentation. These are augmented on the international scene by (a) the British Education Index, (b) the Bulletin signaletique des Sciences de l'Education in France, and (c) EUDISED that spans 16 countries in Western Europe. These repositories do not, however, suffice as the sole sources of information on mastery learning programs and personnel internationally. Another option that exists and has been used fruitfully is that of the so-called foreign affiliate membership rosters of national professional organizations (e.g., AERA and APA). Furthermore, membership lists from international organizations (e.g., the International Council of Psychologists and the International Association of Applied Psychology) are useful in tandem with those of national organizations as a basis for periodic mailed surveys inviting input on mastery learning efforts that for whatever reason are not included in the standard data bases. Finally, as alluded to earlier the availability of various communication networks linking scholars who share similar research interests can ensure an ongoing dissemination of professional knowledge that otherwise may go untapped.

Recommendations for Advancing Mastery Learning Efforts

The third and final dimension of mastery learning that serves to define its international perspective involves recommendations

for advancing worldwide mastery learning initiatives. These recommendations are three in number: (a) establishing communication networks for material and personnel resources; (b) determining topical areas of focus for researchers and practitioners; and (c) formulating research and development methodologies consistent with the topical areas of focus.

Establishing communication networks. These networks would focus on material and personnel resources in mastery learning and would enhance their accessibility worldwide through professional societies, forums/conferences, and data bases/repositories. An initial effort in this regard could very well entail establishing an International Society for Mastery Learning that would sponsor forums both in printed forms (e.g., quarterly newsletter and/or journal) and as biennial conferences (e.g., in affiliation with already-established national and/or international research organizations). This proposed professional society could likewise function as an international data base or repository for identifying, housing, consolidating, and monitoring mastery learning initiatives worldwide.

Determining topical areas of focus. Based on the activities of the communication networks suggested above, this recommendation would ensure an ongoing agenda for researchers and practitioners interested in advancing mastery learning efforts internationally. Presumably, the level of coordination implied here would result in the avoidance of unnecessary overlap and the encouragement of needed mastery learning research in areas considered to be most important.

Formulating research and development methodologies. This third recommendation would identify methodologies (a) consistent with the needed topical areas of investigation and (b) appropriate to the tasks of identifying, initiating, monitoring, and disseminating mastery learning efforts. A crucial feature embedded in this recommendation is that of recognizing and accessing data bases or repositories of mastery learning efforts throughout the world so as to capitalize on the mastery learning documentation as well as resource personnel already available in various countries.

References

Anderson, C. A. (1985). Comparative education center, University of Chicago. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 2) (pp. 854-855). New York: Pergamon Press.

Anderson, L. W. (1981). A functional analysis of mastery learning. Outcomes, 1(2), 1-3.

Anderson, L. W., & Block, J. H. (1985). Mastery learning model of teaching and learning. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 6) (pp. 3219-3230). New York: Pergamon Press.

Ardila, R. (1982). International psychology. American Psychologist, 37, 323-329.

Badmus, G. A. (1976). Bloom's model of mastery learning as an instructional strategy in mathematical education of UPE teachers. West African Journal of Teacher Education, 20(2), 231-243.

Berry, J. W., Poortinga, Y. H., Segall, M. H., & Dasen, P. R. (1992). Cross-cultural psychology: Research and applications. New York: Cambridge University Press.

Block, J. H. (Ed.). (1971). Mastery learning: Theory and practice. New York: Holt, Rinehart, & Winston.

Block, J. H. (1980). Promoting excellence through mastery learning. Theory Into Practice, 19, 66-74.

Block, J. H. (1985). Belief systems and mastery learning. Outcomes, 4(2), 1, 4-14.

Block, J.H., & Burns, R. B. (1976). Mastery learning. In L. S.Shulman (Ed.), Review of research in education (4th ed.) (pp. 3-49). Itasca, IL: F. E. Peacock, Inc.

Bloom, B. S. (1968). Learning for mastery. Evaluation Comment, 1(2). [Unpaginated]

Bloom, B. S. (1971). Individual differences in school achievement: A vanishing point? (A Phi Delta Kappa Monograph). Bloomington, IN: Phi Delta Kappa International.

Bloom, B. S. (1976). Human characteristics and school learning. New York: McGraw-Hill.

Bloom, B. S. (1978). New views of the learner: Implications for instruction and curriculum. Educational Leadership, 35, 563-568, 570-576.

Bloom, B. S. (1980). The new direction in educational research: Alterable variables. Phi Delta Kappan, 61,(6), 382-385.

Brickman, W. W. (1985). Comparative and international education. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 2) (pp. 851-853). New York: Pergamon Press.

Brislin, R. W. (Ed.). (1990). Applied cross-cultural psychology (Vol. 14 of the Cross-Cultural Research & Methodology Series). Newbury Park, CA: Sage Publications.

Canino, C., & Cicchelli, T. (1988). Cognitive styles, computerized treatments on mathematics achievement and reaction to treatments. Journal of Educational Computing Research, 4(3), 253-264.

Carroll, J. B. (1963). A model of school learning. Teachers College Record, 64, 723-733.

Chan, K. S., & Cole, P. G. (1986, April). An aptitude-treatment interaction in a mastery learning model of instruction. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA. (ERIC Document Reproduction Service No. ED 271 719)

Chaudhari, U. S., & Vaidya, S. (1986). Effectiveness of concept attainment (CA) and mastery learning (ML) models in language learning. Psycho-Lingua, 16(2), 119-127.

Chen, L. H. (1987). A study of mastery learning and its effects on mathematics education in elementary school. Unpublished master's thesis, National Taiwan Normal University, Taiwan, Republic of China.

Combs, F. S. (1985). Comparative studies of educational policy. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education (Vol. 2) (pp. 884-887). New York: Pergamon Press.

Council of Europe. (1974). Compensatory education workshop documents (Strasbourg, October 7-11, 1974). Strasbourg, France: Author, Documentation Center for Education in Europe. (ERIC Document Reproduction Service No. ED 121 419)

Creemers, B. P. M. (1976, October). The project: Education and social environment, Rotterdam (The Netherlands) Paper presented at the annual meeting of the International Management Training for Educational Change, Los Angeles. (ERIC Document Service Reproduction No. ED 215 041)

Cummings, W. K. (1977). The secret of Japanese education: The role of education in socioeconomic achievement--a comparative study (Final Report). Washington, DC: National Institute of Education, DHEW. (ERIC Document Reproduction Service No. ED 147 202)

Dahllof, U. (1978). Curriculum evaluation, frame factors and teaching for mastery (Uppsala Reports on Education 2). Sweden: Uppsala University, Institute of Education. (ERIC Document Reproduction Service No. ED 167 492)

Debeauvais, M. (1985a). Documentation in comparative education. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 2) (pp. 859-865). New York: Pergamon Press.

Debeauvais, M. (1985b). International institute for educational planning (IIEP). In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 5) (pp. 2669-2671). New York: Pergamon Press.

de Gruijter, D. N. (1985). Compromise models for establishing examination standards. Journal of Educational Measurement, 22(4), 263-269.

Drever, A. (1987). Mastery learning in the secondary school: A report of school based research (Stirling Educational Monograph No. 17). Stirling, Scotland: University of Stirling, Department of Education.

Dyck, W. E. (1976). Geschiktheid en selectie in het universitair onderwijs. [Aptitude and selection for university]. Doctoral dissertation, University of Antwerp, Antwerp, Belgium.

Dyck, W. E., & Wellens, J. (1979). Een opkomend instructieparadigma: Beheersingsleren. [An emerging instructional paradigm: Mastery learning]. Persoon en Gemeenschap, 31, 180-190.

Dyck, W. E., & Wouters, P. (1989). A peculiar evaluation of Belgian teacher education programs. Outcomes, 8(2), 50-54.

Dyck, W. E., Van de Looverbosch, M., & Wouters, P. (1982, March). Improving the effectiveness of undergraduate education: An experience from a Belgian university. Paper presented at the annual meeting of the American Educational Research Association, New York. (ERIC Document Reproduction Service No. ED 219 011)

Eckstein, M. A. (1985). Comparative education: Concepts and theories. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education (Vol. 2) (pp. 855-858). New York: Pergamon Press.

Fishbein, S. (1979). Heredity-environment influences on growth and development during adolescence: A longitudinal study of twins (Studies in Education and Psychology 4). Stockholm, Sweden: Stockholm School of Education, Department of Educational Research. (ERIC Document Reproduction Service No. ED 183 615)

Flammer, A. (1973). Individuelle differenzen im lernen nach der mastery learning strategie. Zeitschrift fur Experimentelle und Angewandte Psychologie, 20(4), 529-546.

Foster, P. (1985). Comparative education: Area studies. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 2) (pp. 853-854. New York: Pergamon Press

Gay, J. E. (1984). An analysis of aptitude as a predictor of achievement in an individualized mode of health instruction. British Journal of Educational Technology, 2(15), 150-155.

Guskey, T. R., & Gates, S. L. (1986). Synthesis of research on the effects of mastery learning in elementary and secondary classrooms. Educational Leadership, 43, 73-80.

Guskey, T. R., & Pigott, T. D. (1988). Research on group-based mastery learning programs: A meta-analysis. The Journal of Educational Research, 81(4), 197-216.

Hall, J. P. (1990). Lessons from the First European congress of psychology. American Psychologist, 45, 978-980.

Heater, D. (1985). International education: Educational programmes. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 5) (pp. 2666-2667). New York: Pergamon Press.

Holmes, B. (1985a). Comparative education: International nongovernmental associations. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 2) (pp. 867-869). New York: Pergamon Press.

Holmes, B. (1985b). History of comparative education. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 2) (pp. 865-867). New York: Pergamon Press.

Holmes, B. (1985c). International bureau of education (IBE). In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 5) (pp. 2648-2649). New York: Pergamon Press.

Husen, T. (1985). International education. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 5) (pp.2660-2666). New York: Pergamon Press.

Hymel, G. M. (1982). Mastery learning: A comprehensive bibliography (2nd ed.). New Orleans: Clearinghouse on Mastery Learning, Loyola University.

Hymel, G. M. (1990, April). Harnessing the mastery learning literature: Past efforts, current status, and future directions. Paper presented at the annual meeting of the American Educational Research Association, Boston.

Hymel, G. M. (1991). AERA's SIG/mastery learning since its inception (1981-1991): A 10-year retrospective-prospective view. Outcomes, 10(3), 24-33.

Ignas, E., & Corsini, R. J. (Eds.). (1981). Comparative educational systems. Itasca, IL: F. E. Peacock Publishers, Inc.

Imrie, B. W. (1984, July). In search of academic excellence: Samples of experience. Paper presented at the International Conference on Improving University Teaching, College Park, MD. (ERIC Document Reproduction Service No. ED 294 467)

Irvine, S. H., & Berry, J. W. (Eds.). (1988). Human abilities in cultural context. Cambridge: Cambridge University Press.

Kallen, D. (1985). Comparative education society in Europe. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 2) (pp. 872-874). New York: Pergamon Press.

Katz, N. (1986). Time needed to learn as a function of individual learning style and teaching method. Studies in Educational Evaluation, 12, 237-239.

Keller, F. S. (1968). Goodbye, teacher . . . Journal of Applied Behavior Analysis, 1, 79-89.

Keller, F. S., & Sherman, J. G. (1974). PSI: The Keller plan handbook. Menlo Park, CA: W. A. Benjamin, Inc.

Kim, H. (1971). Mastery learning in the Korean middle schools. UNESCO Regional Office for Education in Asia, 6(1), Sec. 1, 55-60.

Kim, H. (1975). Experimentation in education, mastery learning in Korea. Paris: International Institute for Educational Planning. (ERIC Document Reproduction Service No. ED 132 155)

King, K. (1985). International development research center (IDRC). In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 5) (pp. 2659-2660). New York: Pergamon Press.

Kremer-Hayon, L., & Ben-Peretz, M. (1984, April). A strategy of professional development for dealing with individual differences in the classroom: An Israeli case. Paper presented at the annual meeting of the American Educational Research Association, New Orleans. (ERIC Document Reproduction Service No. ED 246 041)

Kulik, C. C., Kulik, J. A., & Bangert-Drowns, R. L. (1990). Effectiveness of mastery learning programs: A meta-analysis. Review of Educational Research, 60(2), 265-299.

Kulik, J. A., Kulik, C. C., & Cohen, P. A. (1979). A meta-analysis of outcome studies of Keller's personalized system of instruction. American Psychologist, 34, 307-318.

Laboratory of Comparative Human Cognition. (1986). Contributions of cross-cultural research to educational practice. American Psychologist, 41, 1049-1058.

Lahdes, E. (1983). Mastery learning in theory and in practical innovation. Scandinavian Journal of Educational Research, 27(2), 89-107.

Langeheine, R. (1982, April). State mastery learning: Dynamic models for longitudinal data. Paper presented at the annual meeting of the American Educational Research Association, San Francisco.

Lee, Y. D. (1977). KEDI (Korean Educational Development Institute) instructional strategies. Paris: United Nations Educational, Scientific, and Cultural Organization; International Institute for Educational Planning. (ERIC Document Reproduction Service No. ED 180 061)

Lewy, A., & Nevo, D. (Eds.). (n.d.). Evaluation roles in education. New York: Gordon & Breach.

Maginnity, G. F. (1976). A personalized system of instruction in library use. Monterrey, Mexico: Instituto Technologico de Monterrey. (ERIC Document Reproduction Service No. ED 125 530)

Martuza,V. R. (1986). Evaluation of reading achievement in Cuban schools: A comparative perspective. The Reading Teacher, December, 306-313.

McBeath, C. (1986). Curriculum decision making in TAFE (Technical & Further Education). Payneham, Australia: TAFE National Centre for Research and Development. (ERIC Document Reproduction Service No.ED 275 842)

McPherson, F. M. (1986). The professional psychologist in Europe. American Psychologist, 41, 302-305.

Mevarech, Z. R. (1986). The role of a feedback-corrective procedure in developing mathematics achievement and self concept in desegregated classrooms. Studies in Educational Evaluation, 12, 197-203.

Mevarech, Z. R. (1991). Learning mathematics in different mastery environments. Journal of Educational Research, 84(4), 225-231.

Mevarech, Z. R., & Werner, S. (1985). Are mastery learning strategies beneficial for developing problem solving skills? Higher Education, 14, 425-432.

Moghaddam, F. M. (1987). Psychology in three worlds. American Psychologist, 42, 912-920.

Morrison, H. C. (1926). The practice of teaching in the secondary schools. Chicago: University of Chicago Press.

Noah, H. J. (1985). Comparative education: Methods. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 2) (pp. 869-872). New York: Pergamon Press.

Nordin, A. B. (1980). Improving learning: An experiment in rural primary schools in Malaysia. Evaluation in Education: An International Review Series, 4(2), 143-263.

Ottobre, F. M. (1985). International association for educational assessment (IAEA). In T. Husen & T. N. Postlethwaite (Eds.), The interrational encyclopedia of education: Research and studies (Vol. 5) (p. 2644). New York: Pergamon Press.

Parkinson, B. L., Mitchell, R. F., & Johnstone, R. M. (1983). Mastery learning in modern languages--a case study. PLET, 20(1), 43-53.

Peacock, C. (1981, July). Reading and writing at foundation level: A mastery learning approach. Paper presented at the annual meeting of the United Kingdom Reading Association, Edinburgh, Scotland. (ERIC Document Reproduction Service Number ED 208 400)

Pennycuick, D. B., & Murphy, R. J. L. (1986). Mastery, validity and comparability issues in relation to graded assessment schemes. Studies in Educational Evaluation, 12, 305-311.

Perkins, J. A. (1985). International council for educational development (ICED). In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 5) (pp. 2657-2659). New York: Pergamon Press.

Pizarro Sanchez, R. (1992, April). Quality of instruction, home environment and cognitive achievement. Paper presented at the annual meeting of the American Educational Research Association, San Francisco.

Porras-Zuniga, J. (1985). Comparative statistics in education. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 2) (pp. 874-882. New York: Pergamon Press.

Postlethwaite, T. N. (1985). International association for the evaluation of educational achievement (IEA). In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 5) (pp. 2645-2646). New York: Pergamon Press.

Reed, F. (1983, April). The administration of mastery learning: The Lebanon model. Paper presented at the annual meeting of the American Educational Research Association, Montreal.

Reezigt, G. J., & Weide, M. G. (1990, April). The effects of group-based mastery learning on language and arithmetic achievement and attitudes in primary education in the Netherlands. Paper presented at the annual meeting of the American Educational Research Association, Boston. (ERIC Document Reproduction Service No. ED 317 584)

Reves, T., & Levine, A. (1990, April). From needs analysis to criterion-referenced testing. Paper presented at the World Congress of Applied Linguistics sponsored by the International Association of Applied Linguistics, Thessaloniki, Greece. (ERIC Document Reproduction Service No. ED 324 926)

Rogoff, B., & Morelli, G. (1989). Perspectives on children's development from cultural psychology. American Psychologist, 44, 343-348.

Rosier, M. J. (1985). Comparative studies: Attitudes to schooling. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 2) (pp. 882-884). New York: Pergamon Press.

Russell, R. W. (1984). Psychology in its world context. American Psychologist, 39, 1017-1025.

Sandrin, J. V. (1990). Readiness for individualization and mastery learning: An assessment of educational beliefs among three groups of educators. Germany: Department of Defense Dependents Schools (DODDS) Germany Region. (ERIC Document Reproduction Service No. ED 317 505)

Sexton, V. S., & Misiak, H. (1984). American psychologists and psychology abroad. American Psychologist, 39, 1026-1031.

Shade, B. J. R. (Ed.). (1989). Culture, style and the educative process. Springfield, IL: Charles C. Thomas Publisher.

Sherman, J. G. (Ed.). (1974). PSI personalized system of instruction: 41 germinal papers. Menlo Park, CA: W. A. Benjamin, Inc.

Skaalvik, E. M. (1975). An evaluation of mastery learning. Scandinavian Journal of Educational Research, 19(2), 59-74.

Smith, R. J. (1983). On Ardila's international psychology. American Psychologist, 38, 122-123.

Stanford, J. D., & Imrie, B. W. (1981). Evaluation of a third year distance education course: Monetary economics (Working Papers in Distance Education, No. 1). St. Lucia, Australia: Queensland University, School of External Studies and Continuing Education. (ERIC Document Reproduction Service No. ED 328 235)

Stone, F. D. (1985). International educational administration. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 5) (pp. 2667-2669). new York: Pergamon Press.

Straker, N. (1988). Interactive video: A cost-effective model for mathematics and science classrooms. British Journal of Educational Technology, 19(3), 202-210.

Studman, C. J. (1984). A method of applying mastery learning to moderately large classes. Int. J. Math. Educ. Sci. Technol., 15(1), 95-100.

Sutton, F. X. (1985). International cooperation and assistance in education. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 5) (pp. 2651-2655). New York: Pergamon Press.

Tenenbaum, G. (1986). The effect of quality of instruction on higher and lower mental processes and on the prediction of summative achievement. Journal of Educational Research, 80(2), 105-114.

Tharp, R. G. (1989). Psychocultural variables and constants: Effects on teaching and learning in schools. American Psychologist, 44, 349-359.

Thomas, R. M. (1985). Individualized instruction. In T. Husen & T. N. Postlethwaite (Eds.), The international encyclopedia of education: Research and studies (Vol. 5) (pp. 2446-2451). New York: Pergamon Press.

van der Linden, W. J. (1987). Applications of decision theory to test-based decision making (Project Psychometric Aspects of Item Banking No. 23; Research Report 87-9). Enschede, The Netherlands: Twente University, Department of Education. (ERIC Document Reproduction Service No. ED 309 189)

Vos, H. J. (1988). Simultaneous optimization of decisions using a linear utility function (Research Report 88-15). Enschede, Netherlands: Twente University, Department of Education. (ERIC Document Reproduction Service No. ED 310 127)

Wahby, E. I. E. (1979). Diagnosis and mastery treatment in mathematics: A strategy for remedial teaching in the upper forms of Egyptian primary schools. Unpublished doctoral dissertation, Wales, Cardiff.

Ward, G. (1979). Learning time and teaching for mastery (Occasional Paper No. 15). Victoria, Australia: Australian Council for Educational Research. (ERIC Document Reproduction Service No. 183 596)

Warries, E. (1974, April). Standard mastery curves and skew curves. Paper presented at the annual meeting of the American Educational Research Association, Chicago. (ERIC Document Reproduction Service No. ED 091 422)

Washburne, C. W. (1922). Educational measurements as a key to individualizing instruction and promotions. Journal of Educational Research, 5, 195-206.

Whiting, J. (1982). Cognitive assessment and student attitude. Assessment and Evaluation in Higher Education, 7(1), 54-73.

Whiting, J. (1984). Cognitive and student assessments of a CAL package designed for mastery learning. Comput. Educ., 8(1), 59-67.

Zhongliang, F., Xuyang, Z., & Xiaoping, W. (1984). Experimental research on controlled mastery of concepts. Acta-Psychologica-Sinica, 16(2), 147-154.